

DIGUM: Digital transformation in the research on universe and matter

Guidelines

DIGUM is the bottom-up consortium of ErUM working groups located at universities and research centres. The task of the consortium is the joint implementation of the objectives stated in the white paper “Challenges and Opportunities of Digital Transformation in Fundamental Research on Universe and Matter - Recommendations of the ErUM Committees” [1].

A particular challenge for this consortium of over 8,000 postdoctoral researchers is the heterogeneity of the working groups from the different areas of ErUM. This concerns first the size of the experiments, as well as the amount and type of data, second the number of actively participating scientists and their staff, third methods in the areas of data management, algorithms, computing necessary for the success of the experiment and fourth the level of knowledge and experience with these modern procedures. Under these overall circumstances, substantial improvements and acceleration of ErUM basic research through digital transformation require a suitably positioned organization that ensures national integration of developments and international connections.

DIGUM has an organizational structure (spokesperson and boards), as well as an office with assistants and secretarial staff supporting the ErUM working groups. The DIGUM Overview Board is formed by the elected chairmen of the committees and the BMBF. The Digitization Board acts as the steering committee, with representatives from the 8 ErUM communities with expertise in the field of modern digitization. Five Co-spokespersons chair the research topic boards. The organisational structure DIGUM is reviewed by the International Advisory Board. The legal form of DIGUM is derived from the formation of consortia (research consortiums) which is common practice in project funding.

The foundation and driving force behind the joint work is the continuously evolving vision that modern digitization will substantially accelerate progress in ErUM basic research. Digitisation is a means to an end.

In all decisions, efforts to reach a consensus are paramount. If, in exceptional cases, a consensus decision is not possible, the responsible body will decide by simple majority.

The DIGUM distributed office will be established with a host office at a German research institute within the framework of ErUM-Pro (collaborative research on universe and matter).

The numerous ErUM working groups join together in interest groups on specific topics of modern digitisation (Topic Boards). Following recommendations of the ErUM Committees in document [1], the topics are "Federated Infrastructures", "Big Data Analytics", "Research Data", "User Interface" and "Knowledge Distribution". The structure of the interest groups can be divided up or expanded according to current requirements.

The contributing ErUM working groups develop sustainable solutions in the sense of the above mentioned vision for the modern digitization of ErUM. In the DIGUM interest groups (Topic Boards) proposals for technical solutions, their implementation and suggestions for prioritisation are developed. In doing so, boundary conditions caused by current technical as well as national (e.g. research centres, universities, NFDI) and international developments are included (e.g. international experiments, EOSC). The progress in the implementation of the solutions will be reported and evaluated in the appropriate DIGUM committees.

The planned structure of DIGUM is shown in Figure 1.

Organization DIGUM

Overview Board (OB) 8 Committee Chairs, 1 Resource Provider, 1 Representative of the BMBF, 1 Representative of DESY-PT					
Coordination ErUM-Data Hub	Speaker / 5 Co-Speakers		Digitization Board (DB) Speaker, 5 Co-speakers, 8 Experts from committees, 1 Resource Provider		Resource Provider Board (RB) 10 Resource Providers, 8 Experts from committees
	Administrative Office (AO) Backbone coordination, includes 1 Administration coordinator & Team of 6 Assistants & 1 Secretary		Annual Conference of the ErUM-Data Working Groups		International Advisory Board (IAB) ca. 5 from Science, Industry
Topic Boards	Topic Federated Infrastructures Board: Coordinators, Experts Compute power Utilization Workflows ...	Topic Big Data Analytics Board: Coordinators, Experts Algorithms Autonomization Control & preservation ...	Topic Research Data Board: Coordinators, Experts Data models Management Curation ...	Topic User Interface Board: Coordinators, Experts Scientists questions Developers work User support ...	Topic Knowledge distribution Board: Coordinators, Experts Tenure track programme Workshop, schools ...

Fig. 1: Organigram *Digital Transformation in the research on universe and matter DIGUM*

Overview Board: The OB decides the strategy for the DIGUM consortium. Members of the OB are the elected chairmen of the 8 ErUM committees, the chairperson of the Resource Provider Board, a representative of the BMBF, and a representative of DESY-PT. In order to ensure that all representatives and their deputies are continuously informed, the electronic flow of information should always include the deputies. The OB meets every six months, one meeting may take place during the annual conference, the other by video conference. Minutes of meetings are available to the ErUM working groups. The specific tasks of the OB include 1) Organization of the speaker election: The OB forms a selection committee, which presents its results to the OB. The OB proposes the speaker to the annual meeting. In a secret ballot of those present, the candidate must obtain at least 50% of the votes. 2) Changes in the framework conditions of the umbrella organisation: Changes in the guidelines, expansion of the topics or closure of a topic are pre-formulated in the OB and require confirmation at the annual meeting with at least 50% of the votes. 3) Discharge of the spokesperson, the administration, the Digitization Board with regard to important decisions and finances. 4) Appointment of the coordinators of the Topic Boards.

Digitization Board: The DB is the steering committee for the concerns and the functioning of DIGUM. This is where the medium-term overarching decisions are made. Each committee sends a representative with expertise in modern digitisation to this board. In case of absence he/she has a deputy. To ensure that all representatives are kept continuously informed, the electronic information flow should always include the deputies. The representative and his/her deputy are appointed by the elected committees for a period that does not exceed the committee's term of office. Members of the DB are also spokesperson, the five co-spokespersons as the topic coordinators, the chairperson of the Resource Provider Board. All members are entitled to vote. Spokesperson and co-spokesperson are the chairperson and co-chairperson of the DB. Meetings of the DB take place as required, usually monthly. Reports by the speaker, topic coordinators, coordinator of the administration are mandatory. Minutes of meetings are available to the ErUM working groups.

Resource Provider Board: The RB is the board for all interests of institutions providing computing resources for the ErUM research area. Initially, this includes the 3 Helmholtz centers DESY, GSI, KIT, the Leibniz Institute for Astrophysics Potsdam (AIP) and the university and Max Planck GRID TIER2 centres. The composition of the RB can be updated at any time by the Overview Board. Since the required computing resources are science-driven, each committee sends a representative with expertise in modern digitization to this board. In case of absence, each member has a deputy. In order to keep the representatives continuously informed, the electronic information flow should always include the deputies. The representatives of the major resource providers (DESY, GSI, KIT, AIP) and the group of TIER2 centers each provide the chairperson for 1 year, which results in a 5-year cycle. His or her deputy will take over the management task in the following year. The Chairperson represents the Resource Providers on the Overview Board and Digitization Board.

Spokesperson: The spokesperson will chair the DIGUM organizational structure. The mandate includes the representation of DIGUM towards science, politics, industry etc. as well as the overall decisions of the daily business. The mandate is granted by an election procedure for 2 years, re-election is generally possible. In order to ensure a quick build-up of DIGUM, a spokesperson for the 1-year founding phase of DIGUM is appointed by the Overview Board. From the following phase on, the spokesperson will be sought by a selection committee of the Overview Board and elected by the annual meeting in a secret ballot with at least 50% of the votes. The management function requires

at least half or even all of the FTE and is proportionate to workload financially equivalent to W3 remuneration. Funds for a deputy professorship will be financed if required. The spokesperson reports to the Overview Board and the International Advisory Board.

Five Co-Spokespersons: They act as the chairpersons of the five topic boards and act as a stand-in for the spokesperson. In order to ensure a quick build-up of DIGUM, the 5 spokespersons for the 1-year founding phase of DIGUM are appointed by the Overview Board.

Topic Boards: The ErUM working groups form interest groups according to the major topics in document [1]. Concepts and ideas from the ErUM community are considered and further developed in the Topic Boards. In addition, partners who are interested in the projects and want to actively participate should be identified. Also priority for developing solutions should be proposed. Each TB has a chairperson and a deputy. The members of the Topic Boards are invited to propose suitable chairpersons to the Digitization Board. After pre-selection by the Digitization Board, the chairpersons and their deputies will be appointed by the Overview Board for a period of 2 years. Chairpersons acting also as co-spokespersons, should be actively involved in the research area themselves. The composition of a TB is worked out by the respective chairperson and confirmed by the Overview Board. Meetings of the TB take place as required, usually at least every six months. The chairperson reports to the Digitization Board on projects, progress and challenges.

Annual conference: Every year a conference covering topics related to digital transformation relevant to DIGUM will be organised, with focus on the topics worked on by the ErUM working groups. About 10% of the scientists in ErUM are expected to attend. In addition to scientific exchange, the annual meeting takes decisions (related to possible changes in the framework conditions of the umbrella organization) and elects the spokesperson by secret ballot. All scientists in ErUM who are also entitled to vote in the election of the ErUM committees are entitled to vote. Proposals for resolutions must be submitted to the DIGUM spokesperson at least 10 weeks before the start of the conference and must be made available to all communities by the committees for information and discussion at least 8 weeks before the start of the conference. The final version of the draft resolution should be made available to all ErUM members at least 14 days before the start of the conference. The Overview Board is responsible for the templates.

International Advisory Board: The DIGUM organisational structure and its inclusion in the larger national and international context will be discussed and evaluated by the IAB. The approximately 5 members from science and industry are appointed by the Overview Board for a period of 2 years. IAB Meetings are usually held annually. This meeting is synchronised with the annual conference. At the request of IAB, the Speaker and the Administration Coordinator report on activities, projects and finances.

The Administrative Coordinator is responsible for the functioning of the contact office. Experience is an important element for administrative coordination, so this mandate is given as a full-time E15 position for at least 4 years. The Overview Board decides on the appointment. The specification of tasks and the detailed configuration of the office employees is decided by the coordinator and

confirmed by the Overview Board. The Coordinator is Scientific Secretary of the Overview Board and the International Advisory Board. He/she reports to the Digitization Board, the Overview Board and the International Advisory Board.

Head Office: The consortium of the ErUM working groups is supported by an office with assistants and secretary staff who perform, amongst others, the following specific tasks to support speakers, co-speakers, coordinators, boards and ErUM members in their DIGUM-related tasks (servant leadership):

1. Forming interest groups to solve specific tasks of digital transformation in the run-up to funding announcements and following publication
2. Creating the framework for cooperation within funded projects, reporting on the progress in joint projects and feedback from the interest groups
3. Coordinating applications and searching for suitable project partners
4. Acting as contact person and representative, e.g. for politics, international organisations
5. Strategy Talks: Organising the processes for forming opinions and priorities.
6. Contact for communities in expert knowledge, initial and continuing training
7. External representation and office as contact to industry, computer science, mathematics, students, public & outreach
8. Pooling expertise for modern digitisation in ErUM: Pooling and sharing expertise, obtaining expertise from outside ErUM, transferring expertise outside ErUM, creating training, algorithm development, etc.
9. Organization of the DIGUM annual conference of all ErUM working groups
10. Organisation of a multifunctional web platform with services in the fields of information, documentation, access to platforms for scientific data, data analysis.
11. Organisation of elections.
12. Organization of schools, laboratory courses, workshops, conferences on the topics of DIGUM. Comparison of DIGUM activities concerning events (schools, laboratory courses, workshops, conferences...) with events initiated by other institutions in order to avoid duplication.
13. Organisation of the funding, i.e. travel expenses, allowances for IAB etc.
14. Contact with similar institutions such as the Council for Information Infrastructures ("Rat für Informationsinfrastrukturen" RfII), the management level of the NFDI consortia and of European institutions

References

- 1] Challenges and Opportunities of Digital Transformation in Fundamental Research on Universe and Matter, Recommendations of the ErUM Committees, 29-Apr-2019, Printed at DESY